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CLAIMS

[Claim(s)]

[Claim 1]In a drive method of a liquid crystal display which formed in a substrate two or more gate wires and two or more source wiring which intersects this, and formed a common electrode in another substrate which counters this substrate, Said each gate wire is chosen one by one by impressing the 1st gating signal to each gate wire, While the voltage-poles nature of a source signal impressed to said source wiring is reversed for every source wiring to voltage of said common electrode within a period of this selection, A drive method of a liquid crystal display which is a dot inversion driving system reversed for every gate wiring group of adjoining two lines or more, opens a twice [about] as many period interval as a period when said gate wiring group was chosen, and impresses the 2nd gating signal to said each gate wire.

[Claim 2]A drive method of the liquid crystal display according to claim 1 whose wiring number of said gate wiring group is three or more.

[Claim 3]The 1st substrate in which two or more gate wires and two or more source wiring which intersects these were formed, While the voltage-poles nature of a source signal impressed to said source wiring is reversed for said every source wiring to voltage of said common electrode within the 2nd substrate that carried out the placed opposite to this 1st substrate, and formed a common electrode, and an applied period of a gating signal, An adjoining source driver circuit for source signal impression controlled reversed for every gate wiring group of two lines or more, A liquid crystal display provided with a gate driver circuit which opens a twice [about] as many period interval as a period when said gate wiring group was chosen to said gating signal, and impresses another gating signal to each gate wire.

[Claim 4]The liquid crystal display according to claim 3 whose wiring number of said gate wiring group is three or more.

DETAILED DESCRIPTION

[Detailed Description of the Invention]

[0001]

[Field of the Invention]This invention relates to the liquid crystal display which uses the drive method of a liquid crystal display and this which are characterized by the point which combined 1x2 dot inversion driving and a double-gate signal drive.

[0002]

[Description of the Prior Art]First, the composition of an active matrix type liquid crystal display device is explained with reference to drawing 6.

[0003]The thin film transistor (TFT) 103 formed near the crossing of the gate wire 101, the source wiring 102, and these wiring on the glass substrate 104 and the picture element electrode 109 by which electrical connection was carried out to TFT103 provide, and it is *****. The common electrode 105 which impresses reference voltage to another glass substrate 106 which counters this glass substrate 104 is formed. These glass substrates 104 and 106 keep the gap of about 5 micrometers mutual, a placed opposite is carried out, and a liquid crystal material (not shown) is poured in between the gap.

[0004]Below, the drive method of a liquid crystal display is explained with reference to drawing 6.

[0005]The switching nature of TFT103 is controlled by supplying a gating signal to the gate wire 101 from the gate driver circuit 107. When TFT103 is switch-on, a data signal is impressed to the picture element electrode 109 via the source wiring 102 and TFT103 from the source driver circuit 108, and when TFT103 is non-switch-on, the voltage of the picture element electrode 109 is held. And the molecular arrangement state of a liquid crystal material is changed by the electric field between the picture element electrode 109 and the common electrode 105, and the display properties of a liquid crystal display are controlled. That is, synchronizing with the build up time of the start pulse which controls the output timing of the gate driver circuit 107, pixel charge (voltage impressing) of source signal voltage is started. The width of a gating signal is called the one horizontal period H, and all TFT103 of each gate wire 101 are in a flow (selection) state in the meantime. The one gate wire 101 on the glass substrate 104 is chosen from a board edge at a time by a gating signal one by one, and if selection of all the gate wires 101 is finished, it will shift to the following frame. The period which chooses all the gate wires 101 is called 1 frame period.

[0006]Inversion driving of the source signal of a liquid crystal display is usually carried out in order to prevent a flicker (screen flicker) etc. As the technique of the inversion driving of a signal, line inversion driving and dot inversion driving are adopted. Say dot inversion and reversing the voltage-poles nature of a source signal to the reference voltage of the common electrode 105 every [every gate wire 101 and] source wiring 102 with line inversion driving. It says reversing the voltage-poles nature of a source signal to the voltage of the common electrode 105 every gate wire 101.

[0007]In recent years, in order to improve a horizontal line (direction of gate wire) flicker (screen flicker) corresponding to the high definition-ized demand of multimedia apparatus, adoption of dot inversion driving is progressing. Since light transmittance changes with very small gaps of the voltage impressed to each pixel in the case of an alternating current drive for every pixel, a flicker is generated. For this reason, by dot inversion driving, if the voltage-poles nature of a source signal is reversed every [every gate wire 101 and] source wiring 102, it is expectable to negate more certainly the impressed-electromotive-force gap for every pixel mutually. In a line-inversion-driving method, in order to reverse polarity for every line, display failure called a horizontal cross talk occurs. For example, when a black picture is displayed on a white ground, there is a phenomenon in which a black picture drags on right and left, and this is called horizontal crosstalk phenomenon. This phenomenon originates in causing electric charge leak during the non selection, when the OFF characteristic of TFT103 is insufficient. Since the source signal output of all one horizontal periods is the same polarity in line inversion driving, The influence of coupling between source wiring and a common electrode is great, and by dot inversion driving, while electric charge leak is promoted, since the polarity of a source signal output is reversed for every pixel of one horizontal period, the influence of coupling is small and can negate electric charge leak.

[0008]The example of source voltage polarity patterns of dot inversion driving is shown in drawing 7. To the voltage of the common electrode 105, if source voltage is high, it will be called straight polarity (O seal in [A] a figure), and if conversely low, it will be called

negative polarity (x seal in [B] a figure). The polarity reversals of the voltage-poles nature of the source signal of each pixel are carried out to it of the pixel which adjoins in gate wire 101 direction and the source wiring 102 direction. Such dot inversion is called 1x1 dot inversion. The voltage-poles nature of the source signal is reversed for every frame, in order to prevent polarization of a liquid crystal element.

The voltage-poles nature pattern of (a) of drawing 7 and (b) appears by turns for every frame.

[0009]

[Problem(s) to be Solved by the Invention]However, there were the following problems about the drive method of the liquid crystal display by said conventional example.

[0010](1) One horizontal period is shortened with highly-minute-izing of a pixel insufficient charging liquid crystal display, and, for this reason, a charging period cannot be secured enough. In order to solve this problem, the double-gate drive method of dividing a gating signal into a guard gate ON signal and a regular gate ON signal is introduced, for example to JP4-67122,A. However, since a drive method given in this gazette is a line-inversion-driving method, it cannot solve the problem of the aforementioned horizontal line flicker or a horizontal cross talk.

[0011](2) In the generating checker display of a checker flicker, generating of the flicker was confirmed in 1x1 dot inversion driving. Since the polarity patterns of 1x1 dot inversion driving are the same as a checker, it is thought that flicker visibility was emphasized in the checker display by 1x1 dot inversion driving.

[0012]Therefore, the technical problem of the invention in this application is at the point of providing the drive method of the liquid crystal display which improves a flicker and a cross talk at the same time it relieves the insufficient charging by highly-minute-izing of a liquid crystal display.

[0013]

[Means for Solving the Problem]In order to attain said technical problem, a drive method of a liquid crystal display concerning claim 1, While the voltage-poles nature of a source signal which chose a gate wire one by one and impressed it to the source wiring 102 within a period of this selection by impressing a gating signal to a gate wire is reversed every source wiring 102 to voltage of a common electrode, A dot inversion driving system reversed for every gate wiring group of adjoining two lines or more and a double-gate drive system which opens a twice [about] as many period interval as a period when a gate wiring group was chosen, and impresses other gating signals to a gate wire are combined.

[0014]The 1st substrate with which a liquid crystal display concerning claim 3 formed two or more gate wires and two or more source wiring which intersects this, While the voltage-poles nature of a source signal impressed to said source wiring is reversed for said every source wiring to voltage of said common electrode within the 2nd substrate that carried out the placed opposite to this 1st substrate, and formed a common electrode, and an applied period of a gating signal, An adjoining source driver circuit for source signal impression controlled reversed for every gate wiring group of two lines or more, It has a gate driver circuit which opens a twice [about] as many period interval as a period when said gate wiring group was chosen to said gating signal, and impresses another gating signal to each gate wire.

[0015]

[Embodiment of the Invention]Embodiment 1 is described with reference to one or less embodiment and a drawing.

[0016]The figure with which drawing 1 expresses the block diagram of the drive circuit of a liquid crystal display (LCD), and drawing 2 expresses the polarity patterns of the source signal voltage of 1x2 dot inversion driving, drawing 3, and drawing 4 are the waveform explanatory views of the gating signal of this drive system, and a source signal. The feature

of this drive system is that it used together a double-gate signal and 1x2 dot inversion driving. Here, since the basic constitution of a liquid crystal display is the same as what was shown in drawing 6, the explanation is omitted.

[0017]The control circuit 1 is a controller which supplies gradation data DATA and a LCD control signal to LCD panel 7. As a LCD control signal inputted into the source driver circuit 3, the polarity-reversals control signal POL. There are source signal start pulse STH and the source clock signal CLKH, and there are the gating signal start pulse STV and gate clock signal CLKV as a LCD control signal inputted into the gate driver circuit 2.

[0018]As shown in drawing 2, the voltage-poles nature of a source signal is reversed each [corresponding to the output of the source driver circuit 3] source wiring 5 of every, and 1x2 dot inversion driving means the drive reversed for every wiring group of the 2 line-gate wiring 4 which corresponded and adjoined the output of the gate driver circuit 2. To the voltage of a common electrode, if source voltage is high, it will be called straight polarity (O seal in [A] a figure), and if conversely low, it will be called negative polarity (x seal in [B] a figure). The alternating current drive of the source signal is carried out to the straight polarity and negative polarity side the center [the voltage of a common electrode].

[0019]Polarity reversals avoid polarization of a liquid crystal element, and it is the purpose of preventing afterimages, such as display printing, and is carried out to every [which changes at 60 Hz] frame (screen), and drawing 2 (a) and drawing 2 (b) are illustrating the frame 1 and the frame 2 showing the following screen of that, respectively.

[0020]The improvement of the checker flicker which became a problem by 1x1 dot inversion driving by said 1x2 dot inversion driving can be aimed at. Simultaneously, the horizontal cross talk which became a problem by line inversion driving is also improvable by reversing polarity for every pixel.

[0021]Drawing 3 and drawing 4 explain correlation of a gating signal waveform and a source signal waveform. Here, the signal wave form of the pixel chosen with the gate wire 40 of eye N line and the source wiring 50 of eye M line and the signal wave form of the pixel chosen with the gate wire 41 of a line (N+1) eye and the source wiring 50 of eye M line are explained.

[0022]Two lines of the gate wire 40 of eye N line and the gate wire 41 of a line (N+1) eye become a pair, and constitutes the gate wiring group.

[0023]In the gate wire 40 of eye N line, gating signal impression is started at the time t1. The period when this voltage was impressed is the one horizontal period 1H. And after carrying out 4H lapse of period, another gating signal impression is started by the gate wire 40 of eye N line, and the applied period of voltage is 1H. In the gate wire 41 of a line (N+1) eye, gating signal impression is started at the time t2, and another gating signal impression is started at the time t4 after 4H lapse of period. That is, two gating signals open 4H horizontal period interval, and are impressed to the gate wire 4.

[0024]On the other hand, in order to make every [as which gate wire 4 group of two lines is chosen] period (2H) reverse the voltage-poles nature of the source signal of eye M line, the voltage-poles nature of the source signal of the time t1 is the same as it of the source signal of the time t3. Thereby, after precharging voltage to a pixel at the time t1, regular voltage is impressed to a pixel at the time t3. Thus, in the equal timing of the voltage-poles nature of a source signal, since a gating signal is impressed twice to TFT (double-gate drive), the insufficient charging to the picture element electrode of the voltage of a source signal is cancellable. In particular, one horizontal period is short by highly minute-ization of the liquid crystal display, and the importance of the double-gate drive is increasing.

[0025]Embodiment 2 is described with reference to two or less embodiment and a drawing.

[0026]The voltage-poles nature pattern drawing of 1xN dot inversion driving is shown in drawing 5.

[0027]1xN dot inversion driving reverses the polarity of the voltage of a source signal every source wiring 5, as shown in drawing 5, and it means the drive reversed for every wiring group of adjoining N line gate wiring 4.

[0028]Like Embodiment 1, using a double-gate drive, 2N horizontal period interval is opened and two gating signals are impressed to the gate wire 4 about the waveform of the gating signal in this drive system, and a source signal.

[0029]

[Effect of the Invention]According to the invention in this application, a gate wire is chosen one by one by impressing a gating signal to a gate wire, The dot inversion driving system reversed for every gate wiring group of two lines or more which the voltage-poles nature of the source signal impressed to source wiring reverses for every source wiring to the voltage of a common electrode within the period of this selection, and which both adjoins, By having combined with the double-gate drive system which opens a twice [about] as many period interval as the period when the gate wiring group was chosen, and impresses another gating signal to a gate wire, relieve the insufficient charging by highly-minute-izing, and. The drive method of the liquid crystal display which improves a flicker and a cross talk, and the liquid crystal display using it are obtained.

[Translation done.]